

6.5 Reclaimed Water

Reclaimed or recycled water is water from a wastewater treatment plant (WWTP) that has been treated and can be used for nonpotable uses such as landscape irrigation, cooling towers, industrial process uses, toilet flushing, and fire protection. In some areas of the United States, reclaimed water may be referred to as Irrigation Quality or “IQ” water, but potential uses can extend well beyond irrigation. In fact, with higher levels of treatment, such as reverse osmosis, using reclaimed water as a *potable* source is technically and economically feasible. New technological breakthroughs in membrane filtration and combined biological and filtration treatment offer unprecedented opportunities for water recycling, especially in isolated locations and regions where the water supply is severely limited.

Per capita water use in the United States has quadrupled since the beginning of the 20th century. Americans typically consume between 60 and 200 gallons (230 to 760 liters) per capita each day. The use of reclaimed water for nonpotable purposes can greatly reduce the demand on potable water sources—this use is encouraged by diverse organizations such as FEMP, EPA, and the American Water Works Association (AWWA). Municipal wastewater reuse now amounts to about 4.8 billion gallons (18 million m³) per day (about 1% of all freshwater withdrawals). Industrial wastewater reuse is far greater—about 865 billion gallons (3.2 billion m³) per day.

Opportunities

Facility managers with buildings in areas of chronic water shortage should check with their local water utility and inquire whether they have a program to provide reclaimed water to the building’s location. Reclaimed water programs are particularly popular in California, Florida, Arizona, Nevada, and Texas. There are a host of potential applications for reclaimed water: landscaping, golf course, or agricultural irrigation; decorative features such as fountains; cooling tower makeup; boiler feed; once-through cooling; concrete mixing; snowmaking; and fire main water. Making use of reclaimed water is easiest if planned for at the

outset of building a new facility, but major renovations or changes to a facility’s plumbing system provide opportunities as well. For certain uses, such as landscape irrigation, required modifications to the plumbing system might be quite modest. Note that the use of reclaimed water may be restricted by state and local regulations. If the government facility or base has its own WWTP, there may be an opportunity to modify it to provide *on-site* reclaimed water.

Technical Information

For a successful reclaimed water project, one or more of the following ingredients are required: (1) high-cost water or a need to extend the drinking water supply, (2) local public policy encouraging or mandating water conservation, (3) availability of high-quality effluent from a WWTP, and (4) recognition of environmental or other nontangible benefits of water reuse.

Technologies vary with end-uses. In general, tertiary or advanced secondary treatment is required, either of which usually includes a combination of coagulation, flocculation, sedimentation, and filtration. Virus inactivation is attained by granular carbon adsorption plus chlorination, or by reverse osmosis, ozonation, or UV exposure.

Dual water systems are beginning to appear in some parts of the country where the water supply is limited, such as southern California. Office buildings may have two water lines coming in—one for “fresh” water and the other for reclaimed water. The former is for all potable uses, the latter for nonpotable uses.

Piping and valves used in reclaimed water systems should be color-coded with purple tags or tape. This minimizes piping identification problems and cross-connection problems when installing systems. Liberal use of warning signs at all meters, valves, and fixtures is also recommended. Note that potable water mains are usually color-coded blue, while sanitary sewers are green.

Reclaimed water should be maintained at 10 psi (70 kPa) lower pressure than potable water mains to prevent backflow and siphonage in the event of accidental cross-connection. Although it is feasible to use backflow prevention devices for safety, it is imperative never to connect reclaimed and potable water piping directly. One additional precaution is to run reclaimed water

mains at least 12 in. (30 cm) lower (in elevation) than potable water mains, and separate them from potable or sewer mains by a minimum of 10 ft (3 m) horizontally.

Reclamation can be complex when the water supplier and the wastewater utility are not the same. In addition, issues of water ownership arise when discharged wastewater is withdrawn from one use to accommodate another.



The quality of reclaimed water must be reviewed in order to ensure that there will be no adverse effects from long-term use, such as landscape damage caused by salt buildup, specific ion toxicity, and nutrient buildup.



In St. Petersburg, Florida, more than 5,500 acres (2,200 hectares) of green-space are irrigated with reclaimed water. More than 7,300 customers are served with reclaimed water by the water utility, and usage averages 20 million gallons (76,000 m³) per day. The water is supplied to commercial and residential customers via a “third” main consisting of more than 80 miles (130 km) of piping that ranges from 2 to 48 in. (5 to 122 cm) in diameter. The system also serves 289 fire hydrants and numerous building fire protection systems. The William C. Cramer Federal Building, operated by the GSA, is connected to this system. The building saved 1.4 million gallons (5,300 m³) of fresh water in 1992. Built in 1967 and housing 900 employees, it has more than 15,000 square feet (1,400 m²) of turf, 17 trees, and hundreds of shrubs. This successful use of reclaimed water for irrigation has prompted the GSA Field Office Manager, John F. Bennett, to plan the use of reclaimed water for cooling tower makeup water.



Although water prices vary greatly around the country, reclaimed water costs significantly less than potable water. For example, in Jupiter, Florida, the price of potable water is now \$1.70/1,000 gallons (\$0.45/m³) versus \$0.26/1,000 gallons (\$0.07/m³) for reclaimed water. Similar pricing differences occur wherever reclaimed water is available.

References

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Contacts

Water Environment Federation, 601 Wythe Street, Alexandria, VA 22314; (800) 666-0206; www.wef.org.

American Water Works Association, 6666 W. Quincy Avenue, Denver, CO 80235; (800) 559-9855, (303) 794-6303 (fax); Water Wiser Web Site: www.waterwiser.org.

WaterReuse Association, 915 L Street, Suite 1000, Sacramento, CA 95814; (916) 442-2746. Washington, DC office: 4748 N. 40th Street, Arlington, VA 22207; (703) 536-7533. Offers public information packet designed for use in education and public outreach.